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NEW CENTURY HIGH SCHOOLS

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New Century High Schools are high tech magnet schools that draw students from several attendance areas, and in some cases from different districts. These schools are smaller than many contemporary high schools with a population of no more than 500 students. Class sizes are targeted to be approximately 25 students per class. These schools are structured around the premise that many students have the interest, ability, and desire to move through the formal schooling process much more quickly, and can, in fact, earn at least the equivalent of the first year of a college/university program at the same time a high school diploma is awarded. Students who study two additional summer semesters, which may include the summer semester following high school graduation, could graduate from high school with an Associate of Arts or Science degree. Indeed the particular demands of a science or engineering program may require the additional semesters of work. Students who achieve an Associates Degree would be eligible for a New Century Scholarship which would provide them with a 75% tuition credit at a State university to complete a bachelor's degree.

The New Century High Schools emphasis on science, mathematics, and related applied fields is a primary way of organizing the curriculum. However students would complete a program grounded in the core disciplines required for high school completion and common to the first two years of an undergraduate degree. The purpose of the curriculum is not to prepare students for a particular occupation, but to provide them with the skills, perspectives, and habits of mind that will allow them to be productive life-long learners. Additionally, each school has themes that focus the curriculum and also act to draw student interest. These themes may develop around the strengths of existing programs and from the participation of key schools, colleges, and private sector partners. One such theme might be bioengineering similar and perhaps complementary to the program at the University of Utah. Another theme might be computer simulations and games.

While schools would have multiple themes, each may have a theme unique to a particular school. For example, plant and animal genetics may be a theme in Logan, Utah, due to the significant achievements of Utah State University in these fields. Partnerships between public and higher education institutions would facilitate coordination of programs and promote the easy transfer of students to already established degree programs in higher education. Such partnerships borrow from the experience of New York City students in the Early College Program coordinated with Bard College and Simon Rock College.

Mission, Purposes, and Objectives

New Century High Schools have several key objectives:

- 1.) Provide options for students and parents seeking high quality programs.
- 2.) Create greater interest in science, mathematics, engineering and all of the emerging applications of these fields in the Utah and national economy.
- 3.) Accelerate the progress of students through their educational programs based on their interests, motivation, ability and performance.
- 4.) Create a challenging educational program and intellectual climate for students who intend to complete a higher education degree in math, science, engineering or a related applied field. New Century High Schools will complement, not compete with, the purposes of the Utah College of Applied Technology, aimed at training non-degreed professionals in technology fields.
- 5.) Better meet the needs of Utah's high technology companies which require more scientists, engineers and particularly those individuals who can communicate effectively both orally and in writing, who have the ability to be productive in work teams, and who can solve problems and meet deadlines.
- 6.) Introduce underrepresented populations of students into the fields of science, mathematics and engineering.

Basic Principles

New Century High Schools are not comprehensive high schools and make no attempt to be all things to all students. Each has a distinct mission that sets it apart from other secondary schools, yet each is organized around some key principles and ideas that give coherence to these new institutions. Several key principles follow:

- **Attention to the Individual** Students proceed through their schooling at different rates, they have different learning styles and bring different needs and issues to the classroom. Many schools do not deal effectively with these issues simply because the size of the school and the number of students in a classroom is too great to allow for individual attention. New Century High Schools combat these problems in several important ways. First, the school is limited to no more than 500 students. Faculty and staff get to know students on a more personal level. Second, class size is limited to 25 students per faculty member. Additionally, the ratio of faculty to students is improved by the use of clinical staff who are on loan from participating universities and private sector business partners. Third, each student works under an individual student learning plan that is worked out by the student, his/her family and a faculty advisor assigned to each student. Fourth, students are assigned to advisory groups that meet weekly to discuss educational plans, curriculum issues and problems that occur as part of a growing, developing institution.

- **Smaller Schools** There is a growing body of research regarding the value of small schools. Smaller size is no panacea for all secondary school problems, but there are some very important considerations. For example, smaller high schools have a greater chance of creating a learning climate based on the values of respect and responsibility among students, teachers and the groups that support them. Such values tend to persist within and across these groups.

There are also data that demonstrate that small schools are safer. As noted in a recent publication of the Bill and Melinda Gates Foundation, students in small schools, "...are far less likely to experience physical danger, loss of property, and the demoralizing effects of vandalism."

The value of a more personalized learning environment is perhaps self-evident, but there is good evidence that when students establish relationships with teachers and have adult mentors and advocates, they engaged in more school activities, stay in school longer, and improve their attendance and passing rates.

Small schools are also good for teachers. They have greater opportunities for collaborating with others, addressing the challenges of their work, developing solutions and implementing them. Teachers get to know each other and profit from the experience of their colleagues (both positive and negative). This fosters better practice and greater satisfaction with the overall working climate.

- **Connection with the World of Work** New Century High Schools make significant connections between the subjects of formal schooling, e.g. physics, chemistry, ethics, statistics, art, etc. and real world applications. These connections are made in several important ways. First, the curriculum of these schools includes significant work on projects and real life work applications. The emphasis of New Century High Schools is on active inquiry, rather than on passive learning. Students use a variety of tools, methods and technologies to produce projects and work products. The aim is not to complete a chapter in a book, but to conceive of a project and work to its completion. An example might be the design and development of a medical device to improve the monitoring of blood chemistry. The project would be successful only to the extent that a student understood the physical and chemical processes necessary to make such a device work. Not all projects would be this sophisticated, and the projects would need to be geared to the educational level of each student. But, in every instance the project would make the connection between baseline disciplines and real world applications. Second, the curricular offerings would be enhanced by guest lecturers and practicing scientists who would demonstrate their work in a variety of seminars and demonstration labs. Students would be exposed to the real work of scientists and engineers and have a chance to see how ideas are researched and developed in universities and other research oriented organizations. University and private sector partners would provide practicing scientists and engineers to facilitate this objective. Third, upper level students, typically those in the eleventh and twelfth grades, will have opportunities for internships in a variety of

*Ideally
25:1*

*Teachers
not necessarily
certificated*

*Specifically
science
math &
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settings suited to their own interests and skill level. These internships are not simply add on experiences for students but are fully integrated into the projects and work products students are pursuing. Most students will have two to three internship experiences prior to graduating from a New Century High School.

- **Assessment is Performance Based** Student progress is not exclusively the result of completing class time and fulfilling a certain number of subject matter units. Students will be accountable for the same learning standards applied to all secondary students (UPASS) but also will be judged on the basis of producing products, solving problems, and making written and oral presentations. These work products and projects assume mastery of baseline disciplines that make understanding problems and developing solutions possible. Students may also demonstrate their achievement in more conventional ways by taking a university course on-line that better meets their personal schedule. The emphasis of New Century High Schools will be on what students know and can do rather than how many classes they have taken. Consequently, students may challenge some courses, take equivalency examinations, prepare and present experiments, and employ other similar strategies that allow them to proceed through their individual education plan based on their interest, motivation, and intellectual accomplishments. Graduates would have a performance portfolio that summarizes achievements, projects completed, competencies gained, examinations passed, credit earned, etc.
- **High Standards and Expectations** The purpose of the New Century High School is not to attract only those students who are already engaged in high level work such as those involved in advanced placement classes, but to appeal to a larger, perhaps more diverse, population of students who will respond to the challenge of high level work and become fully involved in the study of mathematics, science, engineering and all of the applications those disciplines make possible. New Century High Schools emphasize literacy in its broad applications and scientific and technical proficiencies. But the emphasis on projects and work products underscores an important point that technical proficiency is not enough. The demands of scientific advancement and the requirements of the rapidly changing economy will require the qualities of curiosity and imagination within the context of a high quality general education that include the arts humanities and social sciences.
- **Common Focus on Curriculum and Goals** New Century High Schools will emphasize science, math and the technologies that emerge from these basic disciplines. The goal for many if not most students will be to qualify for entry at a four-year higher education institution and secure a degree in math, science, engineering and related fields. Students may also choose to pursue a teaching career in one of these fields.

The mission of New Century High Schools should not be mistaken as scientific proficiency only. Students will study history, english, the arts and other core

subjects necessary to become literate competent adults. But the dozens and dozens of course options and programs common in comprehensive high schools will not be duplicated in New Century High Schools.

- **Accelerated Learning** New Century High Schools change the structure of the high school years and compress the number of years normally taken to attain an Associates Degree. The transition from high school to college is an important period for students, but too many students fail to make a successful transition. New Century High Schools will provide opportunities to ease this transition and assist students make better educational and career decisions. Moreover, New Century High Schools will allow students to accelerate their learning and reduce the time needed to secure both a high school diploma and the first two years of college. Accelerated learning can be encouraged with strategies such as the following:
 - **Concurrent or Dual Enrollment** has been used for many years and if planned properly can compress the time required to complete a diploma/degree program.
 - **Making Better Use of the Traditional Twelfth Grade Year** can also accelerate student progress. For many students the twelfth grade has become a year of taking optional or elective courses that do not complement the required curriculum nor advance a student to a successful college experience. Making optimal use of this full academic year can accelerate learning.
 - **Ed Net or Online/Internet Courses** continue to make significant progress in providing challenging educational experiences. Students can take advantage of literally hundreds of courses from accredited institutions that will fulfill requirements and/or augment a student's education independent of the availability and scheduling of traditional classes.
 - **Competency Based Approaches to Learning** are gaining interest. Students learn in a variety of ways outside the traditional classroom environment. Students can demonstrate their knowledge and competence from this non-traditional learning in novel ways. Students who challenge examinations, complete juried projects, make oral presentations to professional groups and present portfolios of completed work can and should be advanced independent of classroom seat time.

These examples of accelerated learning and methods of learning are not intended to be a comprehensive list of the approaches that can be taken. Moreover, it should be emphasized that the point of such methods is not to complete programs more quickly, but to free students from schedules, class time and often duplicative requirements. New Century High Schools will ease the transition from high school to college and promote the idea that students (even those in the ninth grade) can assume challenging academic work and that all students should be advanced based on their intent, ability and demonstrated competence. Accelerated learning strategies will be valuable to the extent that they overcome

facility requirements:
computer
& Tech
capabilities
and
② open
space

existing impediments to a smooth high school college transition and result in a broader, in-depth understanding of core subjects.

Student Population

Enrollment would occur in two stages to allow the new school a relatively quick start and a school population that would permit as many scheduling options as possible. Initially, students who have completed the eighth grade and tenth grades may apply. Eighth graders enter the ninth grade or their first year of a four-year program. Tenth graders enter the first year of the early college program. In this instance the eleventh graders would be involved in completing high school requirements and initiating work normally completed during the first two years of college. At the onset of the second year, another cohort of ninth and eleventh grade students would be admitted, giving each New Century High School a full complement of ninth through twelfth grade students. In subsequent years only a ninth grade class would be admitted to sustain a school at 500. Starting a New Century High School with a single ninth grade class would not be viable.

Admission is open to all students in accordance with charter school rules and guidelines and consistent with admission policies of other educational institutions that hold to non-discriminatory policies and practices. To the extent possible the studentbody will be similar to the demographics of the attendance area from which students are drawn. The New Century High School located in Ogden Utah would have a studentbody broadly representative of the Ogden and Weber Schools' Districts. At the same time the New Century High School will draw a self-selected population of students who see value in a new and innovative school and who have an interest in math, science, and engineering. Particular efforts will be made to provide information to schools, counselors, students, and parents to ensure that the school draws broadly for applicants and still realizes the collateral goals of identifying students interested in math and science and introducing more students from traditionally underrepresented groups. Women, Hispanics, Native Americans, and African Americans historically have been underrepresented in scientific and engineering programs and occupations. As a matter of policy and practice, New Century High Schools will find means to mitigate past barriers and find new means for attracting and retaining these students.

Students will be required to express their interest in a brief written application essay, and wherever possible, students will be interviewed by the faculty and staff prior to admission. Students will be informed about the purposes of the New Century High Schools and advised regarding the nature and requirements of the program, but such counseling will not be the basis for denying admission. All applicants will be admitted unless applications exceed student places. In such instances a lottery will be used for admission purposes. It should be noted that some students may not have a particularly strong academic record, but may have great promise for the purposes of the New Century High Schools, and may fit well within the educational climate of these institutions. Interest, ambition, imagination, and intellectual curiosity will play an important role in a student's success in a New Century High School.

An important consideration for New Century High Schools is broadening the number of students interested in math, science and engineering. Simply capturing existing AP students will not address the purposes of New Century High Schools.

Student recruitment will be assisted by the creation of the New Century Academy which is a statewide network of schools and specifically trained counselors. Students may join the Academy by contacting a counselor in a participating school and expressing interest in an accelerated learning or early college program. Students may complete such a program in their resident school using such means as on-line courses, advanced placement exams, and early college or concurrent enrollment offerings. Other students may also choose to transfer to a New Century High School.

Curriculum

Courses and program requirements will meet all of the graduation standards established by the Utah State Board of Education. The early college portion will meet the generally accepted standards for college level courses and programs. A partnership with a higher education institution will aid this process. Students study English, history, math and science each quarter and choose from elective disciplines such as arts, humanities, social sciences and applied sciences. The educational program is driven more by a project or problem focus than by some of the more traditional instructional methods. This focus is reinforced and supported by lectures, presentations, and demonstrations by research and development faculty from Utah colleges and universities. They will also be conducted by practicing scientists and engineers drawn from private companies who support and contribute to the New Century High Schools.

In addition to the project and program focus of the curriculum, several components add to a unique educational climate. Students participate in research projects and other investigations based on particular themes embedded in the math and science curricula. For example a student could do applied work in the area of medical imaging and use this theme or interest as a way of organizing class work, participating in workshops, completing research or demonstration projects, and preparing for a future career in a related field. Students of junior and senior standing are eligible for internships with scientists and engineers to gain first hand experience with an ongoing research and development project.

Another important aspect of the New Century High School is the ability of faculty and staff to access a full range of courses, programs and other opportunities that fit within an individual student's plan for completing a four-year program of study. All courses are not delivered in an "in person" conventional way. Counselors and teachers broker programs for student to introduce and schedule options that may be available via the electronic high school, the Utah Educational Network or other online components that might be available at virtually any time for the student to access.

Faculty and Staff

Faculty are drawn from both public and higher education. Full-time faculty are augmented by an adjunct staff of practicing scientists and engineers. Faculty are interviewed during an application process and selected on the basis of their teaching performance and their ability to provide intellectual and program leadership in the area of their expertise. These teachers are responsible for the integrity of the program and, in addition to instructional responsibilities, organize small study groups, internships and lab experiences. As instructional leaders each faculty member must have the capacity to delegate some aspects of the instructional program to others depending on the requirements for a given task. In effect the New Century High Schools have a more stratified teaching staff than is found in other schools. Master teachers will orchestrate the instructional program by designing the core elements and teaching the substance of the program, but master teachers also broker some parts of the program and delegate some elements to adjunct faculty, teaching assistants, volunteers and other members of the instructional team. Master teachers will be fully licensed teachers or will be eligible for alternative certification under rules adopted by the Utah State Board of Education. The use of master teachers and use of faculty and instructors from higher education and the private sector will mitigate the draw of qualified faculty (already in short supply) from other schools.

Organizational Structure

New Century High Schools are authorized as charter schools under the general control and supervision of the Board of Education. Charter schools are public schools and are governed by the provisions of charter school statutes and the rules developed by the State Board of Education.

Underlying each New Century High School is an inter-local agreement, which allows governmental entities to join efforts under the provisions of specific agreements. Such an inter-local agreement could conform to Utah statutes, or be a less formal document, but in any case would spell out the duties, responsibilities, obligations, and contributions of each participating organization. In Salt Lake City such an agreement would be worked out among the University of Utah, the Salt Lake City School District, and the Granite School District. In Ogden an inter-local agreement would involve Weber State University, the Ogden City School District, and the Weber County School District. These partnerships are important because the initiation of a new school is costly and each organization has assets (not always cash assets) to contribute to the success of a new high school.

At the same time it should be noted that each organization has important incentives for participating. Public schools can provide a valid new option for students and families that currently does not exist. Moreover they can fulfill an important mission of encouraging the study of science and mathematics, and initiating the means for doing so in a high quality way. Public schools are struggling to attract quality science and math teachers and to assemble the equipment, laboratories, and other resources necessary to

advance high quality math and science programs. New Century High Schools provide a way for them accomplish several key objectives.

Colleges and universities are seeking new recruits, especially those who are fully prepared for the study of math and science. In effect the New Century High Schools become the seed bed for the students who will help the state colleges and universities realize an important goal of doubling the number of science and engineering graduates by the end of 2004 and tripling the number of those same graduates by 2006.

Private sector partners are not typically involved in inter-local agreements but they have an obvious stake in the process. Many high tech industries especially those with needs for computer scientists, engineers, systems analysts and data base administrators cannot find the employees they need to grow their businesses. These partners will play a key role in connecting the curriculum to the demands of the workplace, identifying key scientists and engineers, who will serve as part-time faculty and mentors, creating and supporting internships for senior level students, providing equipment and other resources consistent with the existing and emerging practices of the workplace.

The success of a New Century High School will depend in large measure on the appointment of an advisory board which oversees the basis philosophy and underlying principles that drives each school. Advisory board members are drawn from colleges, universities, boards of education, private sector companies, leading scientists and engineers, and others who embrace the mission and objectives of New Century High Schools and who can broker for them many of the partnerships and funding relationships that will be key to their success.

Advisory boards will be appointed according to the provisions of each charter and the inter-local agreement of participating organizations. The Governor will also play an important role in this process.

Funding

Each New Century High School is created as an independent charter school with funding that would normally flow to any public secondary school in the State. New Century High Schools are eligible to receive the State and local funding that normally are provided to other public schools. At least during the start up stages of development each school will need to establish business and foundation partnerships to secure assistance with start-up costs. Operating budgets may also require some form of supplement to secure long term viability. The gap between revenue expected for a 500 student school and the anticipated operating expenditures for this type of school could run between several hundred thousand dollars depending on such key factors as staffing patterns, building use, reliance on technology for research and instructional purposes. Clearly each school will need to address this gap and secure public and/or private funding to sustain the financial integrity of each school. These new initiatives require an investment of resources, but the prospect of an important advancement in re-framing options for secondary students, accelerating access for students in new ways, promoting high standards of performance in math and

science, preparing new scientists and engineers for high paying jobs, and fueling the State's economy with highly qualified college graduates far exceeds the potential costs.

Planning for the Future

Many of the issues that arise in creating a new school cannot be anticipated during the early conceptual stages of a project but emerge as planning proceeds, problems arise and details are hammered out.

Each New Century High School will have the benefit of a 16-18 month planning period, funded by the Bill and Melinda Gates Foundation. This effort is funded as part of a national early college initiative that is occurring in several locations in addition to Utah.

Planning funds will be sufficient to have a school principal and two associates who will assist in locating a facility, securing business partnerships, recruiting students, raising funds and attending to the dozens of other tasks required to establish and open a new school. Funds are also available to hire key faculty members in advance of the school opening to plan, sequence, and schedule the curriculum and such related components as demonstration labs and internships.

Conclusion

New Century High Schools will provide an exciting option for students and families who are looking for a challenging, high quality education that will prepare students for the requirements of a university level science, math and engineering program. Graduates will be part of a new generation of scientists and engineers who will have a profound impact on the nature of our future society and the security of our local and national economy.